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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/786,707	02/25/2004	Zidu Ma	67,097-023; EH-11106	3642

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EXAMINER

FORTUNA, ANA M

ART UNIT PAPER NUMBER

1723

DATE MAILED: 09/18/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/786,707	Applicant(s) MA ET AL.	
	Examiner Ana M. Fortuna	Art Unit 1723	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 July 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) 1-5 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 6-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>7-13-05</u> and 2/25/4. | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. Claims 6-15 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 1 recites "a method of preventing a liquid from migrating into a non-porous membrane", however, the process steps are directed to a process of making the "non-porous membrane"; the claims are unclear as to whether the process or using, the process of making the membrane, or the process of making a membrane device e.g. a deoxygenator (see claim 15) is intended. Claim 6 is also incomplete, because does not includes the steps preventing a liquid from migrating into the membrane.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 16-20 are rejected under 35 U.S.C. 102(b) as being anticipated by WO 98/35739 (hereinafter WO'739). The fluid separator having a composite membrane including one or a plurality of membrane layers (see Fig. 3, Fig. 1, abstract, and page 3, lines 15-28). The membrane substrate is also disclosed (Fig. 1, element 3).

The membrane material, as claimed in claims 17-19 is disclosed by WO '739 as **fluoropolymer** (abstract, column 3, second paragraph). The membrane is further described as permselective capable of separating by diffusion, or non-porous (see page 4, lines 7-23).

4. Claims 16-18 are rejected under 35 U.S.C. 102 as being anticipated by (WO 02/11868) . WO'968 teaches a membrane with multiple layers and a first layer on top of a support; the membrane is formed on to a support, and is made of a fluoropolymer, e.g. PTFE (Abstract, fig.1, claims 1-3).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 6-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 98/35739 (hereinafter WO'739) in view of Nemser et al (US 5,051,114).

WO'739, discussed above teach making a composite membrane made from glassy perfluorodioxole copolymer, and including multiple layers on a substrate (abstract, page 3, lines 3-28). WO'739 further teaches the process of making the composite membrane as known in the art (see page 3, last paragraph bridging page 4, lines 1-6). Details about the drying step between coating and temperature conditions are not discussed .

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WO'739 teaches that when membrane layers thicker than 0.5-6 micron are desired, multiple coating may be applied, which also protect the membrane against pinholes defects (see page 3, lines 26-28).

Nemser et al, incorporated by reference in the WO'739 reference, teaches making membranes on a support and with defect free layer with a thickness higher than 6 microns, e.g. 800-200 microns, the method of making are recognized to be old in the art (abstract, column 4, lines 49-68, column 6, third paragraph). One of the methods disclosed in patent '114 of Nemser et al. teach making the membrane by solvent casting, including the step of dissolving the fluoropolymer in a fluoro solvent (see column 8, lines 38-52, column 10, last paragraph, bridging column 11), the later section also teaches treating the cast membrane at temperatures 110 degree c for 12 hours), preparing additional membranes and heating the membrane at temperature of 150 degree C for longer time, e.g. an additional hour is also disclosed (see example X, column 12). It would have been obvious to one skilled in the art at the time this invention was made to prepare multilayer membrane of the particular fluoropolymer and dry the membrane layers at temperatures within the ranges suggested in '114, to control membrane permeability, as suggested in '114 (see column 13, lines 9-15), e.g. the membrane heating (drying conditions) affect the membrane permeability, and increase in temperature causes an increase in membrane permeability.

As to claim 1, forming multiple layer, or multiple coating is disclosed in 'WO'739, and the drying conditions are disclosed in Nemser et al, as discussed above.

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As to claim 8, partially dissolving a portion of the first membrane layer is not expressly disclosed by the references above, however, by dissolving the polymer in the same solvent, and with the two layer made from the same polymer, one skilled in the art at the time this invention was made can expect a slight dissolution of the first layer e.g. allowing bonding between the layers. As to claims 9-10, the fluorosolvent disclosed in Nemser et al ('114) seems to meet the boiling point conditions required.

Regarding claim 12, the drying time is directly related to the membrane thickness, it would have been obvious to one skilled in the art at the time this invention was made to dry a membrane layer having a low thickness at the suggested temperature conditions suggested by Nemser et al, and reduce the membrane drying time to avoid energy lost, or alternatively select the drying and temperature time to provide the final membrane with a desired permeability; selectivity is not affected by the temperature treatment (see '114, column 13, lines 9-16).

As to claims 13 and 14, applicant admits rolling coating as conventional (see specification, paragraph 28). One skilled in the art can expect thinner films formation with the conventional rolling process. Regarding claim 15, Patent '114 teaches the use of the membrane in oxygen permeation processes ((see table 10).

7. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over WO 98/35739 (hereinafter WO'739) in view of Nemser et al (US 5,051,114), as applied to claim 6 above, and further in view of Spadaccini et al (US 6,709,492) or Staroselski et al (US 7,041,154). WO'739 and patent '114 fail to teach using the membrane in a fuel deoxygenator of an aircraft.

Patent '492 teach using membranes selective to oxygen and made from perfluorinated glassy polymers in aircraft systems (abstract, column 4, lines 6-13).

Patent '154 teaches also teaches using oxygen permeable composite membrane in deoxygenator system of an aircraft (abstract, element 42, column 3, lines 21-49).

It would have been obvious to one skilled in the art at the time this invention was made to use the membrane of WO'739, and /or Nemser et al ('114) to separate gas by diffusion in the oxygenator system of '492 or '154, based on membrane properties and high oxygen permeability and selectivity.

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Reference 5,281,255 teaches composite membranes of fluoropolymers, and forming the composite by multiple dip coating steps to produce a defect free membrane. 6,896,717 teaches a dioxoles fluoropolymer membrane including more than one layer to protect the top membrane layer (see Fig. 2), and refers to the membrane of Nemser et al to separate oxygen. 6,592,650 teaches composite membranes of perfluorodioxoles made by conventional methods. Additional art represent fluorinated membrane materials and processes of making the membranes.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ana M. Fortuna whose telephone number is (571) 272-1141. The examiner can normally be reached on 9:30-6:00 M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wanda L. Walker can be reached on (571) 272-1151. The fax phone

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number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Ana M Fortuna
Primary Examiner
Art Unit 1723

AF
September 15, 2006